CLAIM AMENDMENTS

Please cancel claims 1-66 and add claims 67-93 as follows:

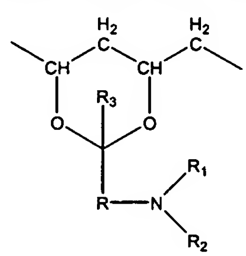
67. (New) A method for making a biocompatible sensor containing a reflection hologram, comprising the steps of:
introducing a crosslinkable and/or polymerizable fluid material into a cavity formed by a mold, wherein the crosslinkable and/or polymerizable fluid material comprise at least a molecular sensing moiety which can interact or react with an analyte of interest to provide an optical signal which is indicative of a change in one or more optical properties of the reflection hologram, wherein the mold has a first mold half defining a first molding surface and a second mold half defining a second molding surface, wherein said first mold half and said second mold half are configured to receive each other such that the cavity is formed between said first molding surface and said second molding surface; and
producing and recording a pattern of interference fringes while polymerizing/crosslinking said crosslinkable and/or polymerizable fluid material in the cavity to form the biocompatible sensor, thereby said pattern is recorded in said biocompatible sensor to form the reflection hologram.
68. (New) The method of claim 67, wherein the step of producing and recording occurs by irradiating said crosslinkable and/or polymerizable fluid material with at least two beams of coherent light, wherein one of the two beams is directed to the crosslinkable and/or polymerizable fluid material through the first molding surface whereas the other beam is directed to the crosslinkable and/or polymerizable fluid material through at least a portion of the second molding surface, wherein the two beams of coherent light form said pattern while polymerizing/crosslinking said crosslinkable and/or polymerizable fluid material to form the biocompatible sensor, thereby said pattern is recorded in said biocompatible sensor to form the reflection hologram.
69. (New) The method of claim 68, further comprising the step of partially crosslinking and/or polymerizing the crosslinkable and/or polymerizable fluid material by actinic irradiation, before the step of producing and recording.
70. (New) The method of claim 68, wherein the crosslinkable and/or polymerizable fluid material comprises a water-soluble prepolymer.

71. (New) The method of claim 70, wherein the water-soluble prepolymer is selected from the group consisting of: a water-soluble crosslinkable poly(vinyl alcohol) prepolymer; a water-soluble vinyl group-terminated polyurethane; a water-soluble crosslinkable polyurea prepolymer; a crosslinkable polyacrylamide; a crosslinkable statistical copolymers of vinyl lactam, MMA and a comonomer; a crosslinkable copolymers of vinyl lactam, vinyl acetate and vinyl alcohol; a polyether-polyester copolymer with crosslinkable side chains; a branched polyalkylene glycol-urethane prepolymer; a polyalkylene glycol-tetra(meth)acrylate prepolymer; and a crosslinkable polyallylamine gluconolactone prepolymer,

wherein the polyurea prepolymer is obtained by reacting an acryloylchloride or an isocyanate group-containing acrylate or methacrylate with a polymerization product of NH_2-terminated polyalkylene glycols and di- or polyisocyanates optionally in the presence of a triamine,

wherein the vinyl group-terminated polyurethane is obtained by reacting an isocyanate-capped polyurethane with an ethylenically unsaturated amine (primary or secondary amine) or an ethylenically unsaturated monohydroxy compound, wherein the isocyanate-capped polyurethane is a copolymerization product of at least one polyalkylene glycol, a compound containing at least 2 hydroxyl groups, and at least one compound with two or more isocyanate groups,

wherein the crosslinkable poly(vinyl alcohol) is a polyhydroxyl compound which has a molecular weight of at least about 2000 and comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, I and II, I and III, or I and II and III



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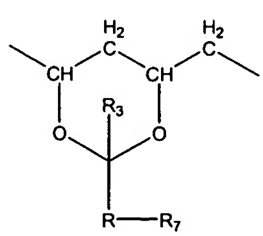

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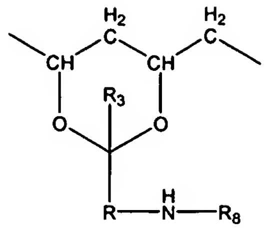

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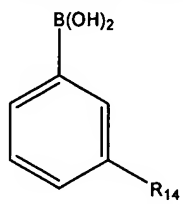
wherein R is alkylene having up to 12 carbon atoms; R_1 is hydrogen or lower alkyl having up to seven carbon atoms; R_2 is an olefinically unsaturated, electron-withdrawing, crosslinkable radical having up to 25 carbon atoms; R_3 is hydrogen, a C_1 -C_6 alkyl group or a cycloalkyl group; R_7 is a primary, secondary or tertiary amino group or a quaternary amino group of the formula $N^+(R')_3X^-$, in which each R', independently of the others, is hydrogen or a C_1 -C_4 alkyl radical and X is a counterion selected from the group consisting of HSO_4^-, F^-, Cl^-, Br^-, I^-, CH_3COO^-, OH^-, BF^-, and $H_2PO_4^-$; and R_8 is the radical of a monobasic, dibasic or tribasic, saturated or unsaturated, aliphatic or aromatic organic acid or sulfonic acid.

72. (New) The method of claim 70, wherein the molecular sensing moiety is a phenyl boronic acid having formula (4), (5), or (6)



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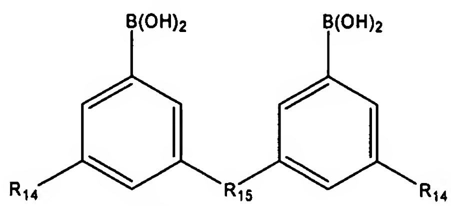

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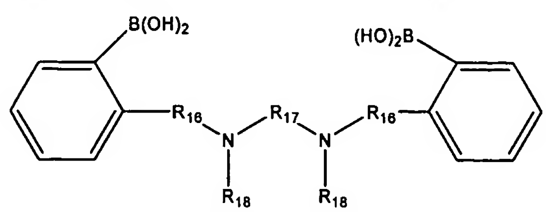


(6)

wherein R_{14} and R_{18}, independently of each other, are olefinically unsaturated, crosslinkable radicals; R_{15} and R_{16}, independently of each other, are alkylene having up to 12 carbon atoms; and R_{17} is an arylene having 6 to 12 carbon atoms, a saturated bivalent cycloaliphatic group having 6 to 10 carbon atoms, arylenealkylene or alkylenearylene having 7 to 14 carbon atoms or arylenealkylenearylene having 13 to 16 carbon atoms.

73. (New) The method of claim 70, wherein the crosslinkable and/or polymerizable fluid material is an aqueous solution, wherein the aqueous solution includes a low molecular weight additive which exhibit a limited compatibility with a polymer matrix resulted from the crosslinkable and/or polymerizable fluid material, but good compatibility with water, wherein the low molecular weight additive is present in an amount sufficient to increase refractive index differences (delta n) between high and low irradiated areas resulted from the pattern of interference fringes.
74. (New) The method of claim 73, wherein the low molecular weight additive is NaCl.
75. (New) The method of claim 68, wherein the crosslinkable and/or polymerizable fluid material comprises at least one prepolymer and optionally a vinylic monomer, wherein at least one of the prepolymer and the vinylic monomer contains aromatic groups in an amount sufficient to increase refractive index differences (delta n) between areas of different polymer densities which are caused by different irradiations resulted from the pattern of interference fringes.
76. (New) The method of claim 67, wherein the second mold half has, on or behind the second molding surface, a mirror to reflect light coming from the first molding surface, wherein the step of producing and recording occurs by directing an incident beam of coherent light to said crosslinkable and/or polymerizable fluid material through the first molding surface, wherein the incident beam and a beam reflected by the mirror form said pattern while polymerizing/crosslinking said crosslinkable and/or polymerizable fluid material to form the biocompatible sensor, thereby said pattern is recorded in said biocompatible sensor to form the reflection hologram.
77. (New) The method of claim 76, further comprising the step of partially crosslinking and/or polymerizing the crosslinkable and/or polymerizable fluid material by actinic irradiation, before the step of producing and recording.
78. (New) A method of claim for making a biocompatible sensor containing a reflection hologram, comprising:

    providing an article having a first surface and an opposite second surface; spraying at least one layer of a crosslinkable and/or polymerizable fluid material onto the first surface of the article, using a spraying process selected from the group consisting of an air-assisted atomization and dispensing process, an ultrasonic-assisted atomization and dispensing process, a piezoelectric assisted atomization and dispensing process, an electro-mechanical jet printing process, a piezo-electric jet printing process, a piezo-electric with hydrostatic pressure jet printing process, and a

thermal jet printing process, wherein the crosslinkable and/or polymerizable fluid material comprise at least a molecular sensing moiety which can interact or react with an analyte of interest to provide an optical signal which is indicative of a change in one or more optical properties of the reflection hologram;

irradiating said crosslinkable and/or polymerizable fluid material with at least two beams of coherent light, wherein one of the two beams is directed to the crosslinkable and/or polymerizable fluid material whereas the other beam is directed to the crosslinkable and/or polymerizable fluid material through the second surface, wherein the two beams of coherent light form a pattern of interference fringes while polymerizing/crosslinking said crosslinkable and/or polymerizable fluid material to form the biocompatible sensor, thereby said pattern is recorded in said biocompatible sensor to form a reflection hologram.

79. (New) The method of claim 78, further comprising a step of partially or completely evaporating a solvent in the crosslinkable and/or polymerizable fluid material, or a step of partially polymerizing and/or crosslinking the crosslinkable and/or polymerizable fluid material, before the step of irradiating.

80. (New) The method of claim 78, wherein the crosslinkable and/or polymerizable fluid material comprises a water-soluble prepolymer.

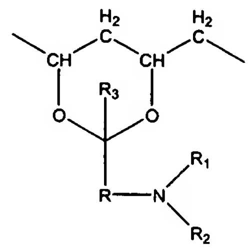
81. (New) The method of claim 80, wherein the water-soluble prepolymer is selected from the group consisting of: a water-soluble crosslinkable poly(vinyl alcohol) prepolymer; a water-soluble vinyl group-terminated polyurethane; a water-soluble crosslinkable polyurea prepolymer; a crosslinkable polyacrylamide; a crosslinkable statistical copolymers of vinyl lactam, MMA and a comonomer; a crosslinkable copolymers of vinyl lactam, vinyl acetate and vinyl alcohol; a polyether-polyester copolymer with crosslinkable side chains; a branched polyalkylene glycol-urethane prepolymer; a polyalkylene glycol-tetra(meth)acrylate prepolymer; and a crosslinkable polyallylamine gluconolactone prepolymer,

wherein the polyurea prepolymer is obtained by reacting an acryloylchloride or an isocyanate group-containing acrylate or methacrylate with a polymerization product of NH_2-terminated polyalkylene glycols and di- or polyisocyanates optionally in the presence of a triamine,

wherein the vinyl group-terminated polyurethane is obtained by reacting an isocyanate-capped polyurethane with an ethylenically unsaturated amine (primary or secondary amine) or an ethylenically unsaturated monohydroxy compound, wherein

the isocyanate-capped polyurethane is a copolymerization product of at least one polyalkylene glycol, a compound containing at least 2 hydroxyl groups, and at least one compound with two or more isocyanate groups,

wherein the crosslinkable poly(vinyl alcohol) is a polyhydroxyl compound which has a molecular weight of at least about 2000 and comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, I and II, I and III, or I and II and III



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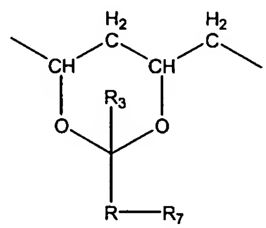

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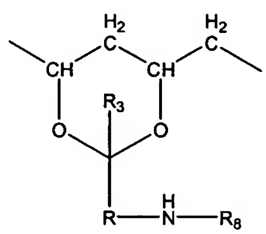

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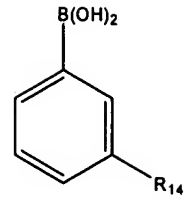
wherein R is alkylene having up to 12 carbon atoms; R_1 is hydrogen or lower alkyl having up to seven carbon atoms; R_2 is an olefinically unsaturated, electron-withdrawing, crosslinkable radical having up to 25 carbon atoms; R_3 is hydrogen, a C_1 -C_6 alkyl group or a cycloalkyl group; R_7 is a primary, secondary or tertiary amino group or a quaternary amino group of the formula $N^+(R')_3X^-$, in which each R', independently of the others, is hydrogen or a C_1 -C_4 alkyl radical and X is a counterion selected from the group consisting of HSO_4^-, F^-, Cl^-, Br^-, I^-, CH_3COO^-, OH^-, BF^-, and $H_2PO_4^-$; and R_8 is the radical of a monobasic, dibasic or tribasic, saturated or unsaturated, aliphatic or aromatic organic acid or sulfonic acid.

82. (New) The method of claim 80, wherein the molecular sensing moiety is a phenyl boronic acid having formula (4), (5), or (6)



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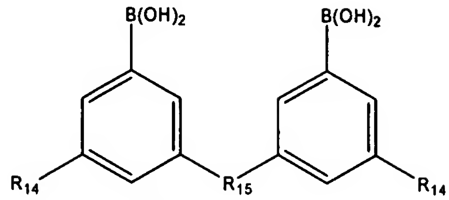

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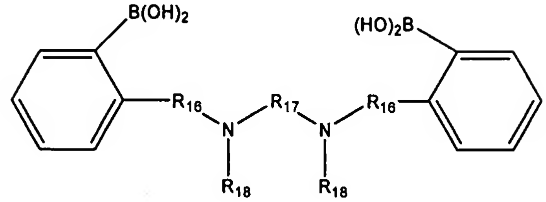


(6)

wherein R_{14} and R_{18}, independently of each other, are olefinically unsaturated, crosslinkable radicals; R_{15} and R_{16}, independently of each other, are alkylene having up to 12 carbon atoms; and R_{17} is an arylene having 6 to 12 carbon atoms, a saturated bivalent cycloaliphatic group having 6 to 10 carbon atoms, arylenealkylene or alkylenearylene having 7 to 14 carbon atoms or arylenealkylenearylene having 13 to 16 carbon atoms.

83. (New) The method of claim 82, wherein the crosslinkable and/or polymerizable fluid material is an aqueous solution, wherein the aqueous solution includes a low molecular weight additive which exhibit a limited compatibility with a polymer matrix resulted from the crosslinkable and/or polymerizable fluid material, but good compatibility with water, wherein the low molecular weight additive is present in an amount sufficient to increase refractive index differences (delta n) between high and low irradiated areas resulted from the pattern of interference fringes.

84. (New) The method of claim 82, wherein the crosslinkable and/or polymerizable fluid material comprises at least one prepolymer and optionally a vinylic monomer, wherein at least one of the prepolymer and the vinylic monomer contains aromatic groups in an amount sufficient to increase refractive index differences (delta n) between areas of different polymer densities which are caused by different irradiations resulted from the pattern of interference fringes.

85. (New) A method for making a biocompatible sensor containing a reflection hologram, comprising the steps of:

providing a mold, wherein the mold has a first mold half defining a first molding surface and a second mold half defining a second molding surface, wherein said first mold half and said second mold half are configured to receive each other such that a cavity is formed between said first molding surface and said second molding surface;

applying a coating of a first crosslinkable and/or polymerizable fluid material onto at least one area on the first molding surface, using a process selected from the group consisting of an air-assisted atomization and dispensing process, an ultrasonic-assisted atomization and dispensing process, a piezoelectric assisted atomization and dispensing process, an electro-mechanical jet printing process, a piezo-electric jet printing process, a piezo-electric with hydrostatic pressure jet printing process, and a thermal jet printing process, wherein the first crosslinkable and/or polymerizable fluid material comprise at least a molecular sensing moiety which can interact or react with an analyte of interest to provide an optical signal which is indicative of a change in one or more optical properties of the reflection hologram;

producing and recording a pattern of interference fringes while polymerizing/crosslinking said first crosslinkable and/or polymerizable fluid material in the coating to form a reflection hologram on the first molding surfaces; introducing a second crosslinkable and/or polymerizable fluid material into the cavity formed by the mold; and

polymerizing/crosslinking the second crosslinkable and/or polymerizable fluid material in the cavity to form the biosensor, wherein the coating having the reflection hologram is transferred from one of the molding surfaces into the biosensor and become an integral part of the biosensor during polymerizing/crosslinking of the second crosslinkable and/or polymerizable fluid material in the cavity.

86. (New) The method of claim 85, wherein the step of producing and recording occurs by irradiating said first crosslinkable and/or polymerizable fluid material with at least two beams of coherent light, wherein one of the two beams is directed directly to the first crosslinkable and/or polymerizable fluid material whereas the other beam is directed to the first crosslinkable and/or polymerizable fluid material through at least a portion of the first molding surface, wherein the two beams of coherent light form said pattern while polymerizing/crosslinking said first crosslinkable and/or polymerizable fluid material to form the reflection hologram.

87. (New) The method of claim 85, wherein the second mold half has, on or behind the second molding surface, a mirror to reflect light, wherein the step of producing and

recording occurs by directly directing an incident beam of coherent light to said first crosslinkable and/or polymerizable fluid material, wherein the incident beam and a beam reflected by the mirror form said pattern while polymerizing/crosslinking said first crosslinkable and/or polymerizable fluid material to form the reflection hologram.

88. (New) The method of claim 85, wherein the first crosslinkable and/or polymerizable fluid material comprises at least one prepolymer and optionally a vinylic monomer, wherein at least one of the prepolymer and the vinylic monomer contains aromatic groups in an amount sufficient to increase refractive index differences (delta n) between areas of different polymer densities which are caused by different irradiations resulted from the pattern of interference fringes.

89. (New) The method of claim 85, wherein the first crosslinkable and/or polymerizable fluid material comprises a water-soluble prepolymer.

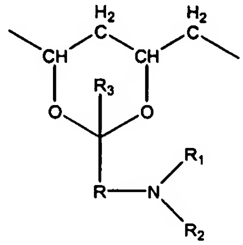
90. (New) The method of claim 89, wherein the water-soluble prepolymer is selected from the group consisting of: a water-soluble crosslinkable poly(vinyl alcohol) prepolymer; a water-soluble vinyl group-terminated polyurethane; a water-soluble crosslinkable polyurea prepolymer; a crosslinkable polyacrylamide; a crosslinkable statistical copolymers of vinyl lactam, MMA and a comonomer; a crosslinkable copolymers of vinyl lactam, vinyl acetate and vinyl alcohol; a polyether-polyester copolymer with crosslinkable side chains; a branched polyalkylene glycol-urethane prepolymer; a polyalkylene glycol-tetra(meth)acrylate prepolymer; and a crosslinkable polyallylamine gluconolactone prepolymer,

wherein the polyurea prepolymer is obtained by reacting an acryloylchloride or an isocyanate group-containing acrylate or methacrylate with a polymerization product of NH_2-terminated polyalkylene glycols and di- or polyisocyanates optionally in the presence of a triamine,

wherein the vinyl group-terminated polyurethane is obtained by reacting an isocyanate-capped polyurethane with an ethylenically unsaturated amine (primary or secondary amine) or an ethylenically unsaturated monohydroxy compound, wherein the isocyanate-capped polyurethane is a copolymerization product of at least one polyalkylene glycol, a compound containing at least 2 hydroxyl groups, and at least one compound with two or more isocyanate groups,

wherein the crosslinkable poly(vinyl alcohol) is a polyhydroxyl compound which has a molecular weight of at least about 2000 and comprises from about 0.5 to about 80%,

based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, I and II, I and III, or I and II and III



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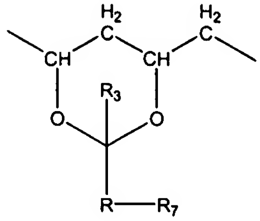

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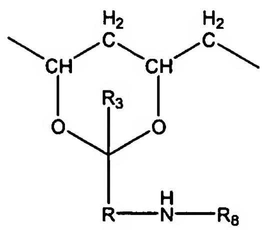
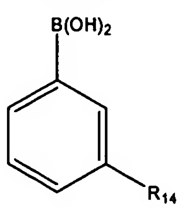


III

wherein R is alkylene having up to 12 carbon atoms; R_1 is hydrogen or lower alkyl having up to seven carbon atoms; R_2 is an olefinically unsaturated, electron-withdrawing, crosslinkable radical having up to 25 carbon atoms; R_3 is hydrogen, a C_1 -C_6 alkyl group or a cycloalkyl group; R_7 is a primary, secondary or tertiary amino group or a quaternary amino group of the formula $N^+(R')_3X^-$, in which each R', independently of the others, is hydrogen or a C_1 -C_4 alkyl radical and X is a counterion selected from the group consisting of HSO_4^-, F^-, Cl^-, Br^-, I^-, CH_3COO^-, OH^-, BF^-, and $H_2PO_4^-$; and R_8 is the radical of a monobasic, dibasic or tribasic, saturated or unsaturated, aliphatic or aromatic organic acid or sulfonic acid.

91. (New) The method of claim 89, wherein the molecular sensing moiety is a phenyl boronic acid having formula (4), (5), or (6)



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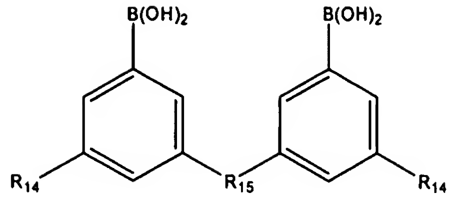

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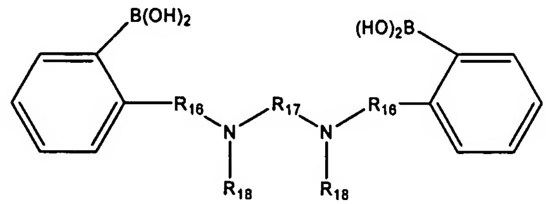

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wherein R_{14} and R_{18}, independently of each other, are olefinically unsaturated, crosslinkable radicals; R_{15} and R_{16}, independently of each other, are alkylene having up to 12 carbon atoms; and R_{17} is an arylene having 6 to 12 carbon atoms, a saturated bivalent cycloaliphatic group having 6 to 10 carbon atoms, arylenealkylene or alkylenearylene having 7 to 14 carbon atoms or arylenealkylenearylene having 13 to 16 carbon atoms.

92. (New) The method of claim 89, wherein the crosslinkable and/or polymerizable fluid material is an aqueous solution, wherein the aqueous solution includes a low molecular weight additive which exhibit a limited compatibility with a polymer matrix resulted from the crosslinkable and/or polymerizable fluid material, but good compatibility with water, wherein the low molecular weight additive is present in an amount sufficient to increase refractive index differences (delta n) between high and low irradiated areas resulted from the pattern of interference fringes.
93. (New) The method of claim 92, wherein the low molecular weight additive is NaCl.